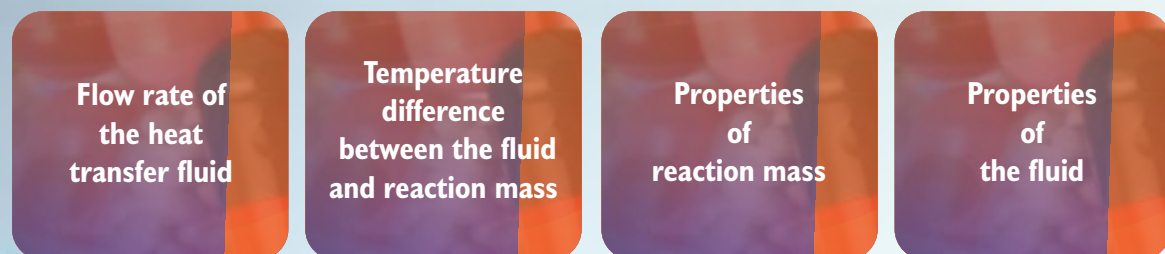


# Why Sunrax

The rate of heat transfer from reactor/dryer to the fluid in the jacket of the reactor /dryer depends on



Key to design, efficiently operating heat transfer system is to understand the interrelationship between above parameters. Our process team has enough experience in this field and can design system to meet customer's specific requirement.

Reliable and trouble free system operation depends upon the selection of key components, mechanical design of system and layout of skid components. Our Mechanical team has experience of building several systems to address this aspect of design effectively.

Last but not the least our site service team is there to support our customers in commissioning, these systems at their respective sites.

## Design-Supply-Commissioning

### PHARMA EQUIPMENT SERVICED BY OUR SKIDS



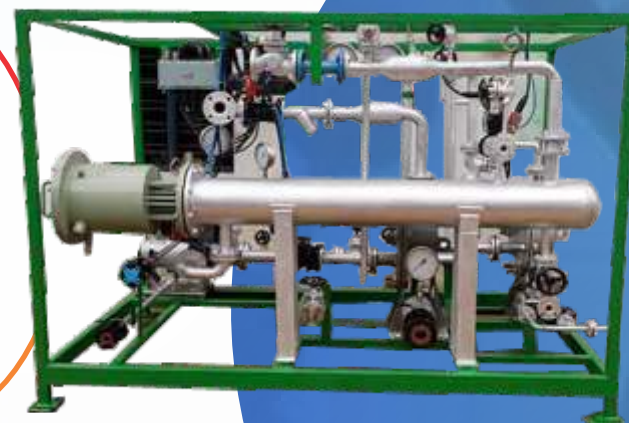
ANFD



REACTOR



VACUUM TRAY DRYER



## Single Fluid Heating & Cooling Systems



## Hot Water Systems

- ◆ Higher product yields and better product quality
- ◆ Reduced manpower operating a simpler system
- ◆ Safer system with improved regulatory compliance

## Design-Supply-Commissioning



### Sunrax Process Technologies

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# Accurate and Reliable “Heating Cooling” Systems

## Need for Heating Cooling Systems

In Manufacturing of Bulk Drugs, API & Fine Chemicals, Batch processing is predominantly employed. Main characteristics of Batch Processing are:

- **Same Equipment for many operations:**

- Batch reaction
- Distillation
- Crystallisation
- Hydrogenation
- Drying

- **Higher level of Manual Intervention & Close Monitoring required**

- **Provide high level of flexibility**

*These characteristics results in cyclical, wide & accurate control of reaction mass or Final Dry Solid Products, hence selection of appropriate heating/cooling system is very important. Options available for heating and cooling of Equipments*

- **Conventional Multiple Utility System**

Use of separate utilities available at fixed temperature and having different composition

- **Single fluid Heating and Cooling System**

A single fluid suitable for required operating temperature is circulated in closed loop with equipment jacket

### Disadvantages of Conventional Utility System

To meet the different temperature demands of single equipment processes, the following utilities are used

- Chilled brine -10°C to - 40°C (14 to - 40°F)
- Chilled water 5°C to 15°C (41 to 59°F)
- Cooling Water 25°C to 35°C (77 to 95°F)
- Hot water 50°C to 95°C (122 to 203°F)
- Low/High Pressure Steam 110°C to 170°C (198 to 338°F)
- Thermal Fluid 180°C to 300°C (356 to 572°F)

Limitations and Disadvantages with Conventional Utility Systems

- Mixing of different utilities (Cross contamination)
- Corrosion and Scaling of Equipment Jacket
- May call for Special Equipment Design (Dual jacket /Limpet)
- Effective Condensate recovery is difficult
- Temperature control accuracy is difficult to achieve
- Thermal shocks to equipment as well as product

### Advantages of SFHCS

A Single Fluid Heating and Cooling System (SFHCS) is the solution with multiple advantages over the conventional multiple utility systems, especially for BATCH PROCESSES.

- No changeover between different utilities avoids cross contamination.
- Non corrosive and clean fluids means “ No Corrosion” and “ No Scaling”
- Thermal fluid having wide temperature range can be selected to provide flexibility.
- Single pipeline for Fluid Inlet and Outlet to process area reduces chances of leakages.
- Non water based utilities reduces risk for water reactive processes.
- Accurate temperature control to  $\pm 1^\circ\text{C}$  can be achieved.
- Automated continuous temperature control without any interruption for changeover possible.
- Fast heating and cooling profiles can be achieved, reducing batch time.
- Programmable ramp based heating and cooling possible meeting requirement of critical processes like crystallization.
- Smooth temperature changeover avoids thermal shock to equipment as well as products.
- 21 CFR compliant Data logging possible for regulatory compliance.

All the above results in

BETTER PRODUCT QUALITY

HIGHER PRODUCT YIELDS

REDUCED MANPOWER COST

MUCH SAFER & SIMPLIFIED OPERATION

IMPROVED REGULATORY COMPLIANCE

### Types of systems offered by SUNRAX

Single Fluid System can be customised to meet customer's process need using following modules designed and Manufactured by SUNRAX

- Individual clean hot water generator – Temperature up to 95°C (203°F)
- Individual clean cold water generator – Temperature up to 10°C (50°F)
- Individual hot thermal fluid generator – Temperature up to 300°C (572°F)
- Individual cold thermal fluid generator – Temperature up to -80°C (-112°F)
- Combined clean hot & cold water generator – Temperature range 30°C to 95°C (86°F to 203°F)
- Combined clean hot & cold thermal fluid generator – Temperature range -100°C to 300°C (-148°F to 572°F)

### Key Components of System

- Mechanically sealed centrifugal Pump or Canned motor pump providing leak tight pumping.
- Gasketed or welded plate heat exchanger providing efficient and quick heat transfer.
- 2 way or 3 Way Globe Control Valve providing accurate temperature control of fluid and product.
- Expansion tank to accommodate volume changes expected in thermal fluid.
- Strainers and non return valves for pump and equipment protection.
- Temperature transmitters and Pressure gauges for measurement of operating parameters.
- All electrical components like drive motor, wiring in flameproof construction.
- Seamless pipes and fitting in Carbon Steel or SS304 based on specific requirement.
- PID or PLC based control system.
- Simple Flameproof Operating Panel or IS HMI as man-machine interface.
- All components are assembled on compact skid to reduce installation and testing time at site.

Typical Fluids considered for system design

Purified water

Glycol solutions

Synthetic organic fluids

Silicone fluids